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Pipelines: A New Look at Canada's Energy Arteries

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THIS IS A PIPELINE

Buried pipelines are safe, silent and unseen. They operate under farmland, under rivers and bridges, under roads and under prairie and bush with little or no impact. A Hudson's Bay Oil and Gas Company Limited oil pipeline runs through the centre of all four of these pictures, and except for the right-of-way cut through the bush there is little if any evidence of its existence.

CANADA'S PIPELINES: A NATION-WIDE NETWORK

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Almost every Canadian uses oil or natural gas. And yet, how many Canadians have actually seen crude oil or natural gas?

Crude oil from Western Canada is gathered by small pipelines from thousands of producing oil wells, and then moved through larger systems to refineries throughout Canada. Refined products (gasolines, diesel fuel, fuel oil, etc.) are often shipped by pipelines from refineries to distribution terminals.

Natural gas moves all the way from well to customer by pipeline. Gathering lines in the West feed into large diameter transmission systems which carry the gas to the various distribution systems. The distributor's pipeline network then delivers the gas directly to the home, business or industry.

This nation-wide network of pipelines is efficient, safe and buried.

TODAY

Most of Canada's domestic oil and gas comes from Western Canada and is moved to market by pipelines. The energy to heat our homes, fuel our industries, drive our cars and meet a thousand and one other needs comes through those pipelines.

TOMORROW

New sources of petroleum energy are being found and developed to meet Canada's long-term oil and gas requirements. These future energy sources, in Western Canada, in the Arctic, and offshore along Canada's East Coast, will be linked to market by pipelines.

HOW SAFE ARE PIPELINES?

Years of experience have proven that pipelines are by far the safest means of transporting petroleum products. Frequency of accidents is the lowest of any form of modern-day transport.

HOW DO PIPELINES AFFECT THE ECONOMY?

Thousands of Canadians are directly employed by pipeline companies: thousands more are employed in the many other segments of the oil, gas and service industries. It has been estimated that in Alberta, one person in three relies on the petroleum industry for employment, and pipelines are a major and vital link in that industry. Pipelines passing through municipalities provide important taxation revenue for the area. They also generate significant national economic benefits, not the least of which is the provision of secure supplies of Canadian energy for Canadian markets.

WHAT EFFECT DO PIPELINES HAVE ON THE ENVIRONMENT?

Pipelines have less environmental impact than any other mode of transportation of petroleum resources. They are buried and the surface is revegetated and restored as nearly to its original state as is practicable. Animals wander freely over buried pipelines; farmers grow their crops over buried pipelines; thousands of people drive by and over buried oil and gas pipelines every day, and never even know they are there.

Compressor station in northern Ontario.

Rec'd: OCT 19 1979
Order No.: 11961
Price: Free
Acc. No.: Canadian Petroleum Assoc.

37258

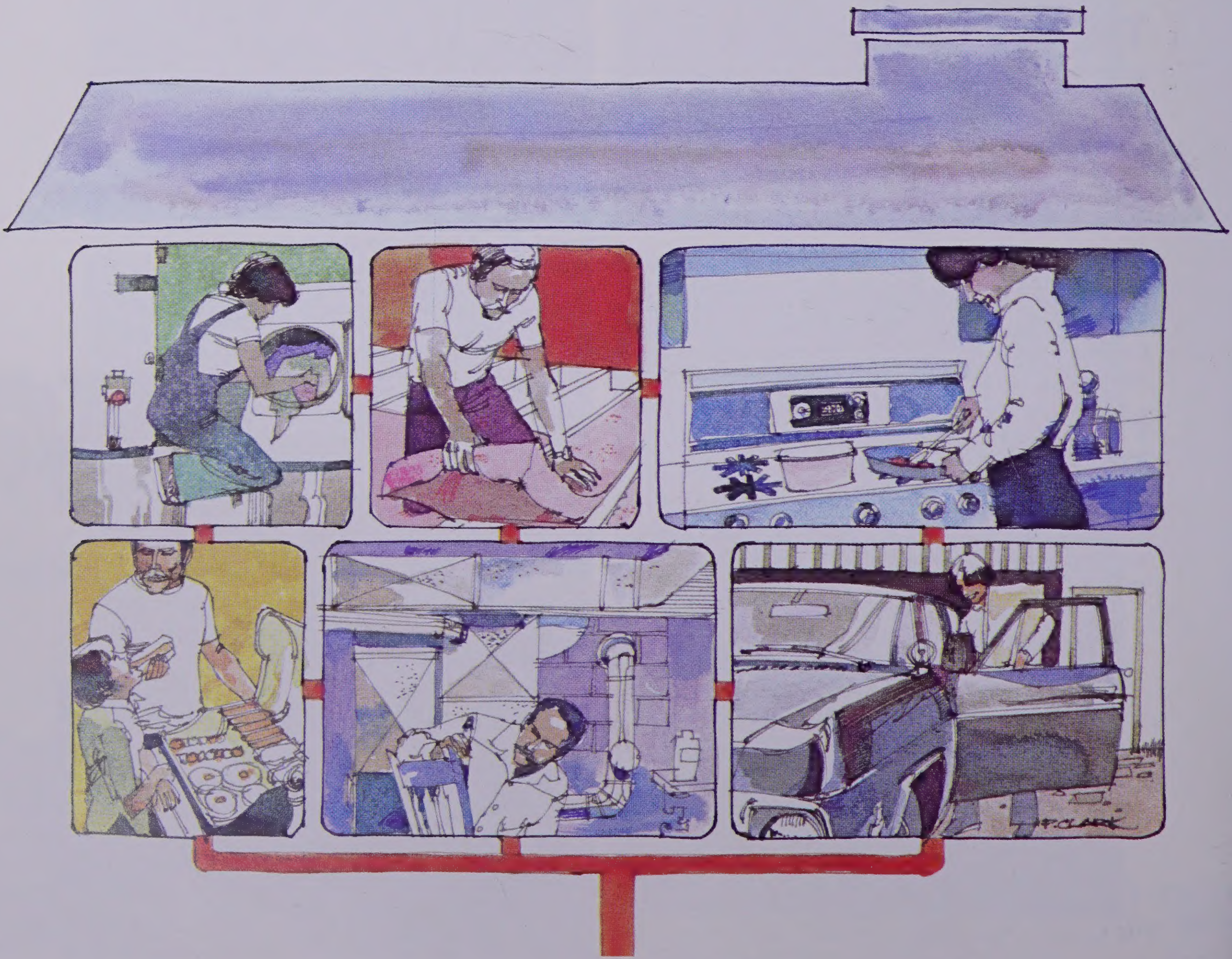
LIFELINES TO CANADIAN HOMES

Petroleum energy — oil and natural gas — accounts for two-thirds of all of Canada's energy needs. Every Canadian relies on petroleum to fill some need, because oil and gas do much more than just run cars and heat homes.

Crude oil is pipelined into the refinery, and out comes gasoline, diesel fuel, aviation fuel, hydraulic oils, petroleum jelly, kerosene, paving asphalt, waxes, greases . . . and numerous feedstock supplies for petrochemical plants that very few Canadians associate with the petroleum industry. Oil heats homes, powers vehicles, fuels industrial plants, lubricates machinery, insulates homes, clothes people, feeds them (petroleum is now being used as the base material for certain protein-rich synthetic foods) and heals them (it is a basic ingredient in many medicines, too).

Natural gas also does much more than heat homes and cook hamburgers on a stove. It is a key ingredient in many industrial processes, such as the manufacture of steel and fertilizers. And it is the raw material for petrochemical industries. For example, ethane is extracted from natural gas and is used to produce ethylene; ethylene, in turn, is used to produce a variety of synthetic materials (or it, too, can be moved by pipeline to other markets – pipelines are extremely versatile).

Oil and gas and their derivatives are present in almost every room of every house. And pipelines are the lifelines that help get them there.



A LOOK DOWN THE LINE

Although Canada's pipeline industry has certainly become a nation-wide highly technical operation it is still a youngster and is still growing. The main cross-Canada transmission systems for oil and natural gas are hardly more than 20 years old.

But in another sense, pipelines are old hat. The concept of a buried pipe to move liquids and gases is thousands of years old.

As early as 5000 B.C., the Chinese were moving water from stream to village through buried bamboo pipelines. The Chinese are also believed to have been the first people to use natural gas moved through pipelines – in 900 B.C.

In the 1800s numerous attempts were made in North America to move oil and natural gas to markets via lead and cast iron pipelines, the degree of success varying greatly from project to project.

The modern era of pipelining began after 1910 with the development of such contemporary tools of the trade as oxy-acetylene welding of pipe joints (1911), the ditching machine (1913), the pipe bending machine (1918) and underground storage of natural gas (1916). Prior to this, most ditch digging and lowering-in work was done by hand and pipe was usually cast iron sections with leaded, sealed joints or threaded screw-type joints.

Since the petroleum industry in this country was really an infant prior to the Leduc discovery in 1947, it is not surprising that the pipeline industry did not really blossom until after that date. Prior to 1947, there was a crude oil pipeline operating from Turner Valley to nearby refineries in Calgary, another from Portland, Maine which moved tanker-shipped crude to refineries in Montreal, and another small system feeding U.S. oil into Ontario. The Canol Pipeline, built during the Second World War from Norman Wells, N.W.T. to Whitehorse, Yukon, had been the longest pipeline ever undertaken in Canada – but by 1947 it had been abandoned. There was a fairly extensive natural gas transmission and distribution system serving Alberta, and other cities had small distribution systems for coal gas.

But within ten years of Leduc, the basic components of today's Canadian pipeline grid were in place.

Interprovincial Pipe Line Ltd. began moving crude oil from Edmonton to Superior, Wisconsin, a distance of 1 820 km (1,130 miles) in 1950. The system was extended another 1 040 km (645 miles) to Sarnia, Ontario in 1953, and another 250 km (156 miles) to Toronto in 1957. The system has been extensively expanded by looping (constructing a second and third line beside the original one) and has been extended into U.S. markets in the Mid-West. In 1976 the Canadian portion of the line was extended to Montreal.

To serve Canada's West Coast, the Trans Mountain Pipe Line was built from Edmonton to the Vancouver and Seattle areas. The first crude oil began moving through this 1 250 km (780-mile) system in 1953.

Westcoast Transmission Co. Ltd., which serves British Columbia natural gas markets, was built from the Peace River gas fields of Northeastern British Columbia to Vancouver and the British Columbia-Washington border. The company began moving gas through its 1 250 km (780 miles) of pipe in 1957.

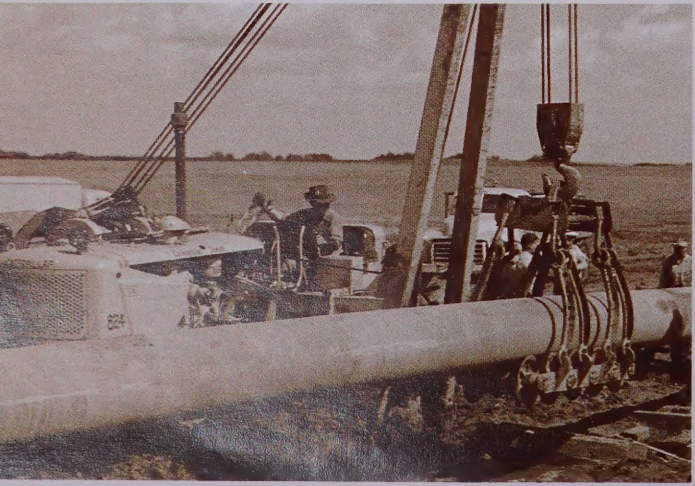
The fourth cornerstone of the Canadian pipeline transmission industry is TransCanada PipeLines. TransCanada's 9 300 km (5,800-mile) system runs from the Alberta-Saskatchewan border to Montreal, providing natural gas for all provinces en route and some U.S. markets from border points along the system. Gas service for Regina, Winnipeg, and Kenora began in 1957. A year later, with completion of the Lakehead-to-Toronto section of the line, gas service began for Ontario and Quebec.

Another system, The Alberta Gas Trunk Line Company Limited, picks up the natural gas within Alberta and delivers it to Alberta utilities and other companies. In its first full year of operation, 1958, the AGTL system consisted of 570 km (354 miles) of pipe. Today the company has a system of 9 660 km (6,000 miles), moves more than 75 per cent of the gas produced in Canada, and is North America's largest gatherer (by volume) of natural gas.

And there are dozens more pipelines operating in Canada today. There are the various gas distribution companies across the country, each with its own extensive pipeline system to deliver gas to its customers. And there are names like Alberta Natural Gas Co. Ltd., Peace Pipe Line Ltd., Pembina Pipe Line Ltd., Trans-Northern Pipe Line Co., Cochin Pipelines Ltd. . . .

The industry has come a long way since bamboo lines, and it's still evolving, still improving.

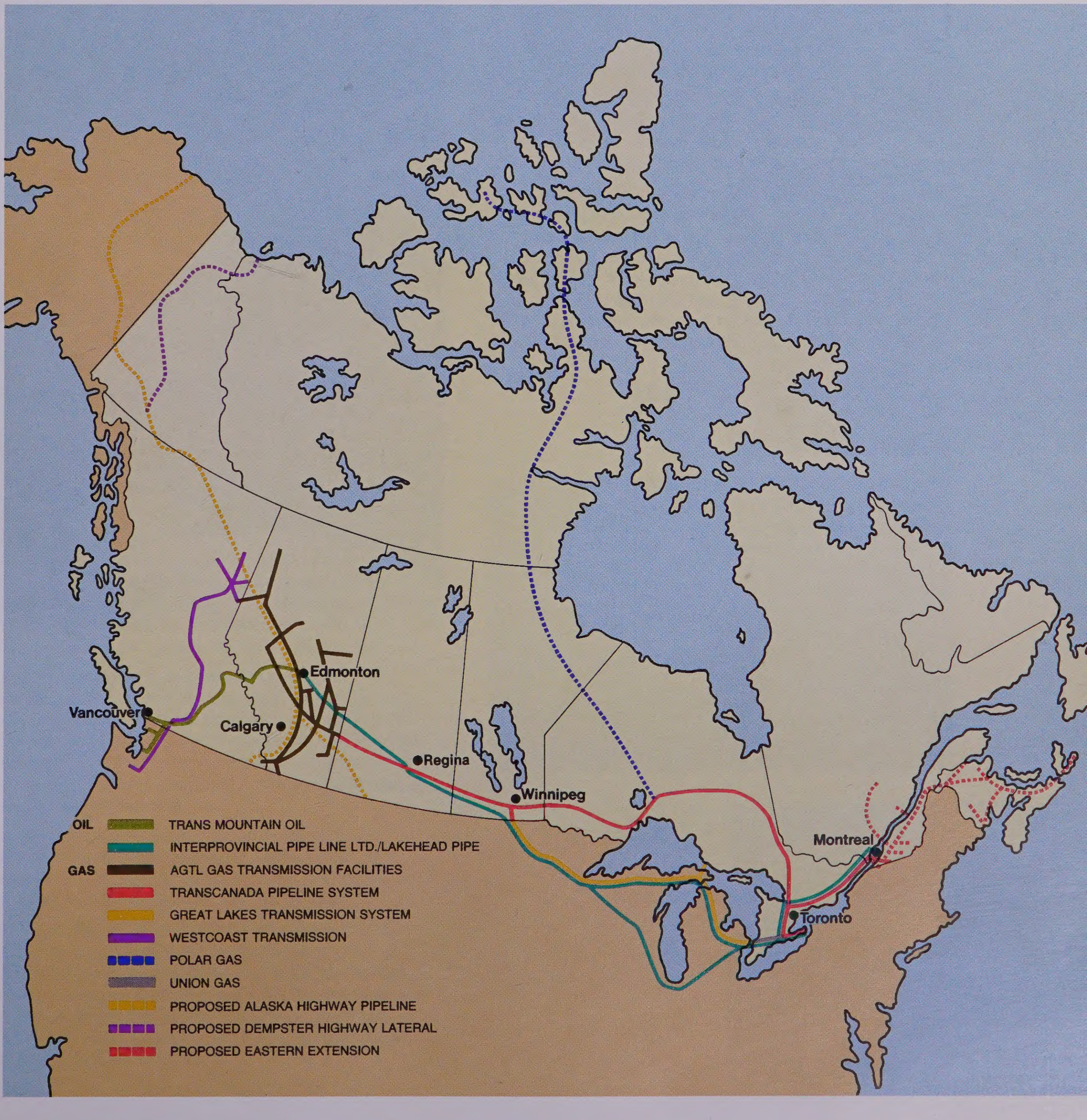
Turner Valley pipeline construction in the 1920s: Canadian Western Natural Gas Company Limited



Construction of the original Interprovincial Pipe Line system, 1950.

OIL AND GAS PIPELINES IN CANADA

Pipelines are the safe, silent, unseen transporters of oil and natural gas. More than 160 000 km (100,000 miles) of pipeline are in operation in Canada moving oil and gas to the millions of Canadians, from Vancouver to Montreal, who rely on petroleum to meet their energy needs.


Edmonton
Vancouver
Calgary
Regina
Winnipeg
Montreal
Toronto
OIL
TRANS MOUNTAIN OIL
INTERPROVINCIAL PIPE LINE LTD./LAKEHEAD PIPE
GAS
AGTL GAS TRANSMISSION FACILITIES
TRANSCANADA PIPELINE SYSTEM
GREAT LAKES TRANSMISSION SYSTEM
WESTCOAST TRANSMISSION
POLAR GAS
UNION GAS
PROPOSED ALASKA HIGHWAY PIPELINE
PROPOSED DEMPSTER HIGHWAY LATERAL
PROPOSED EASTERN EXTENSION

PIPELINE ECONOMICS

For one cent you can move about 2 gm (0.07 ounces) of paper across the country by mail. For one cent, a pipeline moves almost 1 600 gm (3.5 pounds) of oil from Edmonton to Toronto.

For long-distance cross-country movement of oil and gas, pipelines are without doubt the most economical form of transportation. Rail and road transport are also used to move oil over short hauls and in relatively small volumes; and ocean-going tankers are certainly competitive for moving oil from port to port. But over land, and over distance, pipelines provide the best economics.

A major economic advantage of a pipeline, of course, is its non-stop operation: a mainline transmission line operates continually and with small cost of manpower.

Major pipelines are often joint ventures between otherwise competing companies; they co-operate to provide an efficient pipeline that will move all their products at the lowest possible unit cost. By taking mutual advantage of a system capable of moving large volumes at peak efficiency, not only the producer of the oil or gas benefits – the resulting lower cost of energy delivered benefits the consumer as well.

WHO SETS THE RULES?

Pipelines are regulated by government agencies. Pipelines involved in inter-provincial trade or export trade come under the regulation of the National Energy Board of Canada. Pipelines functioning within provincial boundaries are generally under provincial jurisdiction: for example, in Alberta the Energy Resources Conservation Board and the Public Utilities Board have pipeline jurisdiction.

PIPE PRODUCTION

Once, nearly all pipeline materials came from outside the country. Now, almost everything, including the pipe, is made in Canada by the Canadian pipeline industry.

The pipe comes in a variety of thicknesses and diameters. Gathering lines are generally small in size although they can run from 50 mm (2 inches) in diameter to about 600 mm (24 inches) and require only relatively thin-walled pipe. A mainline system might require pipe 600 mm to 1 200 mm (24 to 48 inches) in diameter, made of steel up to 12.5 mm (0.5 inches) or more thick, and capable of withstanding operating pressures of up to 7 000 kilopascals (1,000 pounds per square inch) and more. Even larger pipelines are planned for the future. And then there is the small feeder line that brings the natural gas right into your home. It operates at a pressure of about 1.3 kilopascals (3 ounces per square inch).

Steel is the basic material for oil and gas pipelines today, but there is a wide range of properties and compositions now possible within basic steel. Metallurgical advancements make a specific "blend" of steel available to meet a specific pipelining requirement.

QUALITY CONTROL

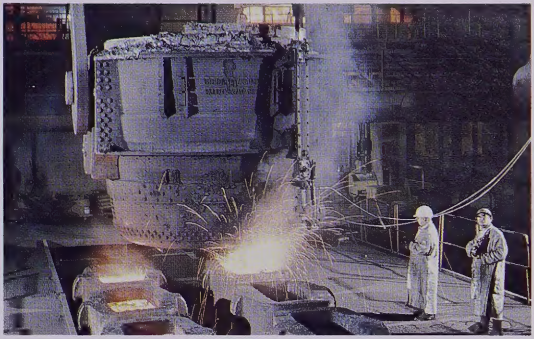
Canadian pipe is second to none, and plants in both Eastern and Western Canada turn out pipe to every size and specification now in use, be it high pressure or low, small diameter or large. Canadian pipe mills are modern and fully automated.

Mill inspection, development of new pipeline metallurgy and new welding techniques, strict standards and design codes, and continued research into electronic inspection of faults all combine to ensure that proper quality control is maintained.

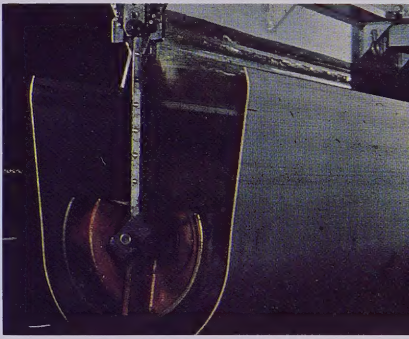
Inspection at the mill is designed to prevent field failures caused by mill defects, and to assure that each joint shipped to the job site is suitable for the intended purpose. Chemical properties of the steel are monitored. Mechanical properties are tested. Welds are carefully examined by X-ray, ultrasonic or fluoroscopic inspection.

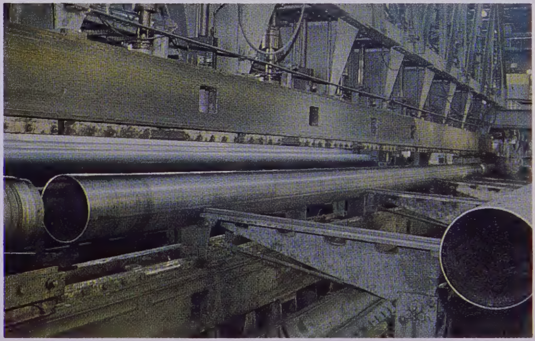
Detailed government and industry codes and standards have been precisely designed for all aspects of the pipeline industry, from the making of the steel to welding to start-up procedures.

The Canadian Standards Association sets standards for a myriad of items used by Canadians. The standards are created by experts from across the country. And just as there is a CSA label on various household products you buy, there is, in effect, a CSA "label" on pipelines built throughout Canada according to CSA standards.

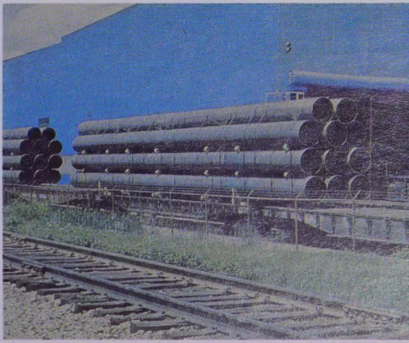


First comes
the steel,
then plate,
then the pipe . . .





. . . The Steel
Company
of Canada
Ltd.



CONSTRUCTIVE BEGINNINGS

Before a pipeline can be built, a number of steps have to be taken. A detailed legal survey of the route must be conducted. The company involved must apply for and obtain all necessary government and regulatory agency approvals and permits to build, and to cross rivers, roads and other public property. And the right-of-way must be acquired. The latter involves direct negotiation with landowners for an easement and frequently involves agreement between company and landowners on special requests involving such matters as livestock, fences and access roads.

Once these matters have been satisfactorily resolved, construction can begin.

First the right-of-way is cleared, usually to a width of about 18 m (60 feet). The usable timber is cut and salvaged; other trees and brush are cut and burned. Then the right-of-way is graded to provide a reasonably smooth surface capable of supporting construction vehicles.

A ditching machine is usually used to excavate the trench, although in some rocky areas controlled blasting is also used. The ditch is dug wide enough to accept the pipe, and to a depth that will allow sufficient cover on the pipe to permit normal land use activities (such as plowing) after construction. Approximately 0.75 to 0.9 m (2½ to 3 feet) of cover is about average.

Sections of pipe are delivered to the site, usually by truck, and the pipe is strung out along the right-of-way. The pipe gang lines up sections of pipe, cleans and prepares pipe ends for welding.

The basic task of the welder is to produce a fused-metal joint between sections of pipe. Welds are inspected before the pipe is buried.

The pipe is then cleaned, primed, coated and wrapped,

Welding large-diameter pipe.

all by machine. Coating provides corrosion protection, as well as protection from damage during subsequent construction procedures.

Side-boom tractors lower the pipe into the ditch. Bulldozers and backhoes fill the ditch, using the earth previously removed by the ditcher. In rock country, sand or earth padding is placed around the pipe first to prevent damage. In farmland, the topsoil is generally kept separate from the subsoils and replaced on top.

All of these operations are carried out simultaneously along a stretch of right-of-way by teams working in unison as part of a pipeline spread. A typical spread might consist of some 250 to 300 men at work, with the front end of the spread (clearing right-of-way) about 5 to 6 km (3 to 4 miles) ahead of the back end (the clean-up crew). In good pipelining country, a spread can move at a rate of 1.5 to 5 km (1 to 3 miles) per day.

The right-of-way is then cleaned up and returned as nearly as possible to normal. Debris is removed, fences rebuilt, and the land in agricultural areas restored to readiness for planting. Where necessary the right-of-way is seeded.

Special construction techniques are used for such special situations as road crossings and river crossings. In the former, the pipe is usually assembled on one side and then pulled through a tunnel bored under the road to eliminate the need to interrupt traffic. In the latter, the pipe is usually assembled, inspected, coated and weighted with concrete weights (to keep the pipe from floating to the surface), then carried across the river by side-booms or on barges, lowered into its riverbed trench and the trench refilled.

Pipe is bent to fit curvature of the land.

Summer construction: laying large-diameter pipe across the Swift Current Valley in Saskatchewan.

PIPELINES AND THE ENVIRONMENT

Pipelines are the preferred method of moving petroleum energy in Canada. They have less environmental impact than any alternative method of transportation.

In particular they:

- have minimal visual impact, since once a line is completed and the surface restored, the only visible evidence of the line is a narrow right-of-way, and a few fixed facilities such as pumping stations and compressor stations (all of which have restricted public access).
- have minimal impact on wildlife, since pipelines are buried and silent.
- create little or no noise or air pollution.
- have little or no impact on other human activities.
- are the most efficient system for moving petroleum over long distances: this is important in a world where conservation of energy must be a priority – the system that moves the most energy to where it is needed, and does so with the least expenditure of energy itself is environmentally preferable.
- are far safer in terms of accident frequency and/or spill frequency than any other alternative.

A pipeline's major impact is during construction, and even then, effects are controlled and modest.

Contemporary pipeline planning includes environmental assessment by professional environmentalists. Effects on wildlife, birds, fish and vegetation are assessed before they occur, and methods to eliminate or at least modify them are incorporated into the planning stages.

Construction can be scheduled to have minimal effect. If it is to be done in farmland, construction can often be timed to avoid planting and harvesting of crops. In more remote areas, construction can be timed to avoid critical periods in the life of wildlife, such as calving season. Every effort is made to avoid important animal populations and endangered species

Construction spread activity is confined to a narrow right-of-way.

sites. Special engineering practices (such as deeper burial) can be utilized to prevent slope instability at steep-banked river crossings.

During construction, care is taken to implement all such environmental safeguards.

In fact, environmental standards, imposed both by federal and provincial governments and regulatory bodies, are as detailed and all-inclusive as are engineering standards for pipelining. These standards are stipulated in construction permits and are monitored and maintained by both government and industry on-site inspectors.

During construction, activity is restricted to the right-of-way. Following construction, the right-of-way is cleaned of all debris, and the surface restored to conform to its original contours.

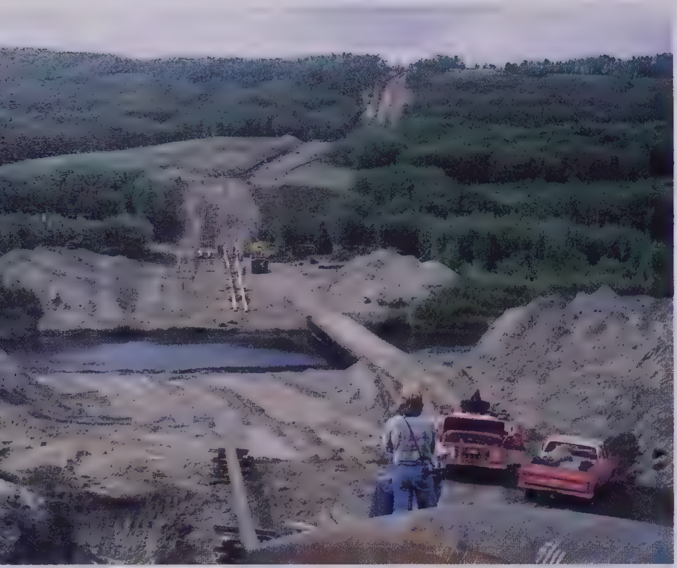
The right-of-way provides no hindrance to human or animal activity. It is either revegetated or the top soil is restored, and the land left ready for planting. Farmers return to normal planting and harvesting activity over top of the buried line, and in more remote areas, wildlife wander up, down and across the right-of-way paying absolutely no attention to it.

Breaks or leaks in pipelines do occur, but infrequently. Pipelines are now designed for computer-monitored operations, and at the first sign of a drop in pressure, valves can immediately seal off a suspected leak. Industry and government have emergency procedures and clean-up equipment ready for quick action.

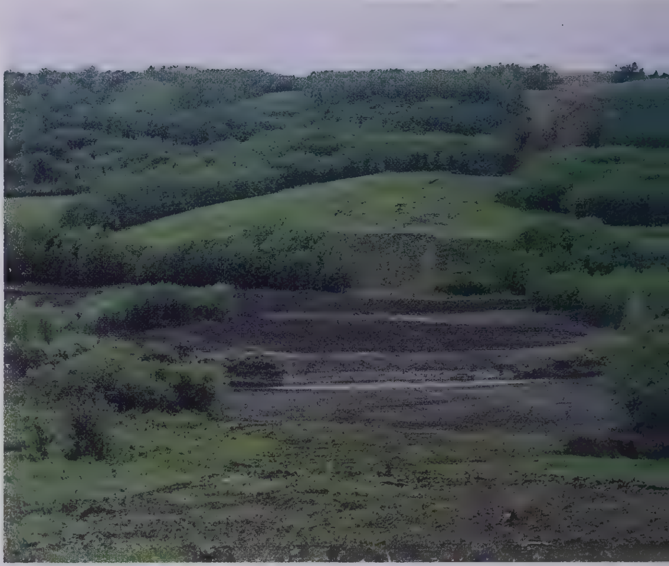
Oil companies, through regional associations, have set up some 90 co-operatives across Canada to purchase and use oil spill equipment and be ready to respond rapidly if a spill should occur. In almost all cases, after a spill has been cleaned up the affected area can be completely restored to its original condition.

While pipeline equipment failures, corrosion-induced failures and welding failures do sometimes occur, it is also significant to note that the largest single cause of pipeline failure is rupture by an external source – such as a bulldozer digging too deep and inadvertently breaking a line. In other words, human failures, not pipeline failures, are the problem.

After construction the right-of-way
is restored and returned to the owner's use.



Summer 1977 — Construction of the Cochin pipeline, crossing the Battle River.



Spring 1978 — The same location, after clean-up, restoration of the site, and revegetation (the new grass cover has just started to come up).

Protection of archaeological sites containing evidence of habitation by prehistoric peoples is also a part of environmental protection. Before a pipeline is built, the right-of-way is surveyed by archaeologists to identify any such sites which could be disturbed by construction. If a particularly valuable site is found, the pipeline can often be relocated to avoid the site. For sites of lesser importance, the key information can be recovered from the site by qualified archaeologists before construction begins in the area. This is done by test excavations, such as shown here.

PIPELINE SAFETY

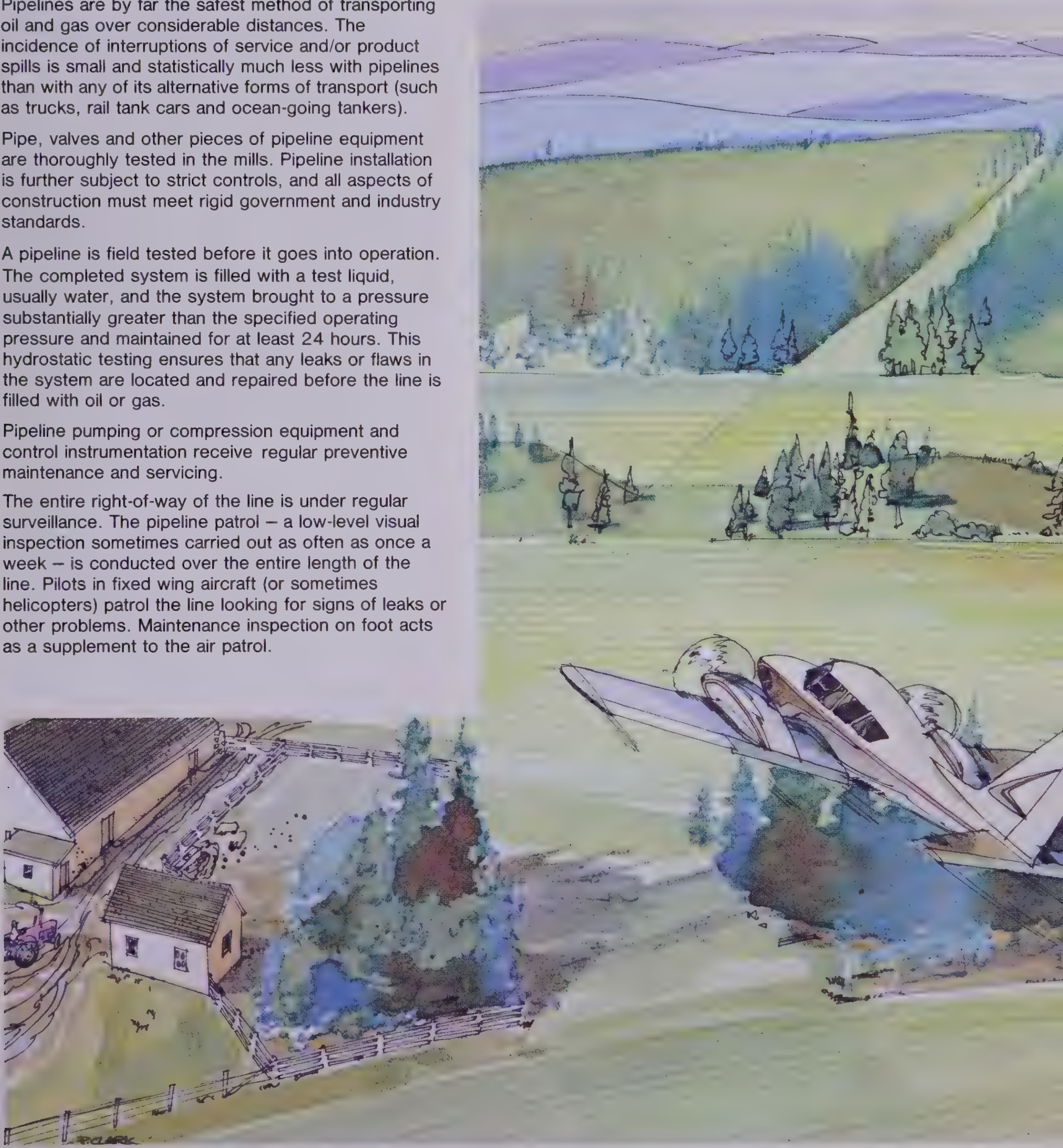
Pipelines are by far the safest method of transporting oil and gas over considerable distances. The incidence of interruptions of service and/or product spills is small and statistically much less with pipelines than with any of its alternative forms of transport (such as trucks, rail tank cars and ocean-going tankers).

Pipe, valves and other pieces of pipeline equipment are thoroughly tested in the mills. Pipeline installation is further subject to strict controls, and all aspects of construction must meet rigid government and industry standards.

A pipeline is field tested before it goes into operation. The completed system is filled with a test liquid, usually water, and the system brought to a pressure substantially greater than the specified operating pressure and maintained for at least 24 hours. This hydrostatic testing ensures that any leaks or flaws in the system are located and repaired before the line is filled with oil or gas.

Pipeline pumping or compression equipment and control instrumentation receive regular preventive maintenance and servicing.

The entire right-of-way of the line is under regular surveillance. The pipeline patrol – a low-level visual inspection sometimes carried out as often as once a week – is conducted over the entire length of the line. Pilots in fixed wing aircraft (or sometimes helicopters) patrol the line looking for signs of leaks or other problems. Maintenance inspection on foot acts as a supplement to the air patrol.



PIPELINE OPERATION

OIL PIPELINES

While oil pipelines are used mainly to move crude oil to refineries, they are also used to move other petroleum products. Each shipment of a specific grade of crude oil or a different petroleum product is called a batch, and shipments are moved through the line in batching sequence, one behind the other.

The oil is kept moving through the pipeline by pumps which move the oil along at about 3 to 5 km per hour (2 to 3 miles per hour). Distance between the pumping stations depends largely on the terrain – in mountain areas stations may be 100 km (60 miles) apart or closer; in easier terrain they may be 200 km (125 miles) apart.

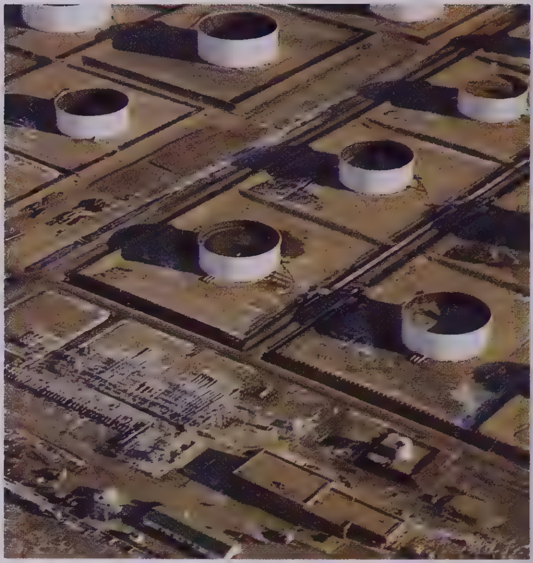
Pumping station equipment varies. Centrifugal pumps, reciprocating pumps, rotary and other forms of positive displacement pumps have all been used. Power to drive the pumps is provided by electric motors, gas engines, large diesel engines or gas turbines. Where electric power is available, it is usually considered the most attractive.

NATURAL GAS PIPELINES

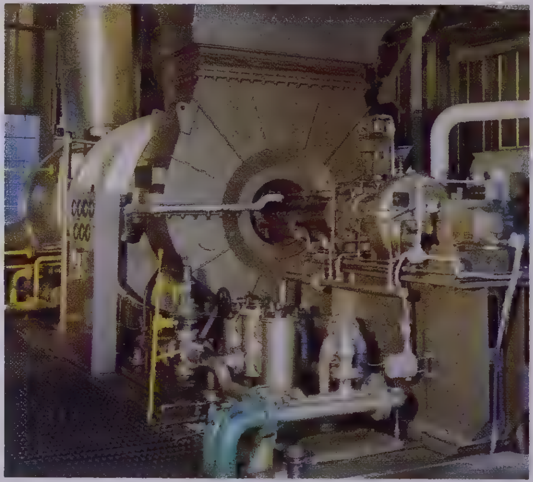
Like oil, natural gas is moved cross-country through pipelines, receiving a "push" every so often from a pump/compressor station. Friction between flowing gas and the inside surface of the pipe causes pressure drop, so compressor stations must be situated every 100 to 110 km (60 to 70 miles) to keep the gas moving.

Compression power is provided by reciprocating engines, industrial gas turbines and adapted aircraft turbines. Fuel for the engines can also come from a variety of sources; often it is gas from the line itself.

When the gas reaches a distribution company's system, it is measured and reduced in pressure so it can flow through the distribution line to homes, businesses and industries.



Edmonton tank farm — start of the Interprovincial oil pipeline.



Compressors are driven by powerful engines.

COMPUTER CONTROL

Both oil and gas pipelines can now be operated by electronic computer control. At one time, staff had to be on the job at all pump/compressor stations, but in recent years the trend has been to remote control of the lines.

Maintenance crews are still available at strategic locations with enough equipment and material to handle everything from routine maintenance to emergency repairs along the line. But normal operation of the system is now usually handled from a central control location.

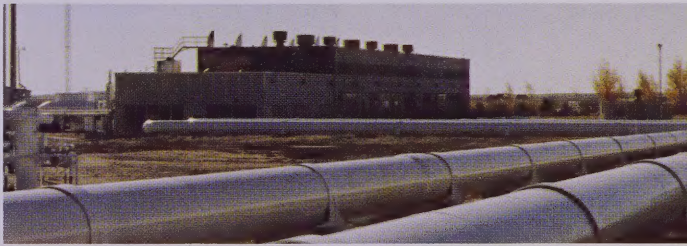
Computers can monitor flow, keep track of volumes, do the scheduling and even handle the billing of customers. Telemetering systems can send pressure and temperature data from key points along the pipeline route to the central control location. Remotely controlled valves and pump/compressor units can be activated at the flick of a switch. In the event of a leak or line break, the valves can be closed automatically and the suspect section of line isolated and shut down immediately.

EFFICIENCY

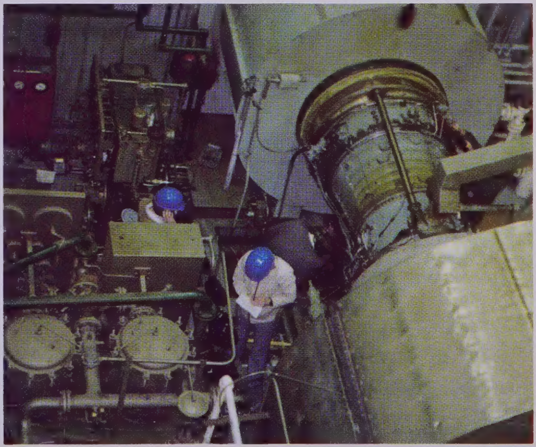
Computer control and automated operation contribute greatly to the efficient operation of pipelines. They help maximize use of resources, minimize waste and provide safe, economic, non-stop service.

Other aspects of pipeline efficiency and conservation of resources are under regular review and improvement by pipeline operators. Gas lines are sandblasted to smooth the surface and improve flow. Waste heat from stations is reused and research into further use of waste heat in commercial (e.g. agricultural) enterprises is being conducted. Improved equipment is being developed to move more oil and gas at less cost and with less expenditure of fuel.

Computers
at field locations
feed transmission data
to dispatch headquarters
hundreds of miles away.



Compressor stations clean and repressurize moving natural gas.



Compression for pipelines has advanced from reciprocal drive compressors to turbine power.

WE'RE ON THE MOVE TO KEEP CANADA ON THE MOVE

While Polar Gas conducts northern pipeline research, Dome/Canmar explores for oil and gas in the icy Beaufort Sea.

Canadians will rely on oil and natural gas for a good many years to come.

Canada has an abundance of energy to develop in the Alberta oil sands, in coal deposits, in oil and gas in the High Arctic and Beaufort Sea, in deep drilling finds in Western Canada, in East Coast offshore oil and gas. The energy is there: it just has to be developed and brought to market in a timely, economic manner.

In future, pipelines will tap northern and offshore petroleum reserves, and plans have been advanced to extend mainline gas transmission further east (to the Maritimes), and further west (to Vancouver Island).

Considerable planning has already gone into preparation for pipelines from the Arctic. Detailed environmental engineering and socio-economic research has been undertaken. The challenges of working and building in the bitter Arctic cold, of working in permafrost and muskeg and solid rock, and of undersea pipelining in the North are all being met.

Other research is being conducted into future uses of pipelines. Pipelines that move slurries (coal, gravel and ore suspended in liquids) are in operation now, and pipelines that move solids are being tested and developed. Reversing the direction of flow of existing pipelines is being considered as one way of meeting new challenges with older, established facilities. Research into multiple-use pipelines – lines that can carry oil and gas in the same pipe – continues.

Future energy requirements will produce new challenges and new techniques, and a variety of methods of transportation will likely be used to move this energy to markets. But you can be sure that pipelines will continue to be an integral part of Canada's transportation system and an integral part of its energy future.

CANADIAN PETROLEUM ASSOCIATION PIPELINE DIVISION

The Alberta Gas Trunk Line Company Limited
Alberta Natural Gas Company Ltd.
Aquitaine Company of Canada Ltd.
Anadarko Petroleum of Canada Ltd.
BP Canada Limited
Canada-Cities Service, Ltd.
Canadian-Montana Pipe Line Company
Canadian Western Natural Gas Company Limited
Chevron Standard Limited
Imperial Oil Limited
Foothills Pipe Lines (South Yukon) Ltd.
Gibson Petroleum Company Limited
Great Canadian Oil Sands Limited
Gulf Canada Limited
Home Oil Company Limited
Hudson's Bay Oil and Gas Company Limited
Husky Oil Ltd.
Interprovincial Pipe Line Limited
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